Final Project Group Proposal

Group_1

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Problem description

Facial expression is a primary way to convey emotions and intentions of human beings. Detecting facial expression promotes communication between individuals. With the development of technology, facial expression recognition has attracted special research attention. A large volume of studies has been focused on "automatic facial expression analysis because of its practical importance in sociable robotics, medical treatment, driver fatigue surveillance, and many other human-computer interaction systems" (Li & Deng, 2018).

In the field of machine learning, facial expression recognition has been well developed due to the improvement of database and deep leaning techniques. Compared to traditional laboratory-controlled database such as the Extended CohnKanade (CK+) and the MMI database, new web database includes larger amount of expression pictures from real world, thus providing sufficient data for deep learning network.

Data introduction

As mentioned in last section, Real-world Affective Face Database (RAF-DB) is used to train and test neural networks in this project. RAF-DB contains 29,672 real-world facial images from Internet. These images are divided into two subsets: single-label subset, including seven classes of basic emotions, and two-tabs subset, adding twelve classes of compound emotions. In this study, we only used single-label subset, which contains 15,339 images that are annotated into seven types of labels: "Surprised", "Fearful", "Disgusted", "Happy", "Sad", "Angry", and "Neural". Furthermore, single-label subset is split into two groups: 12,271 training images and 3,068 testing images. It is worth mentioning that RAF-DB adopts crowd-sourcing method to annotate images. 315 annotators label images into one of seven basic emotions, and each image is annotated

around 40 times. As a result, RAF-DB is relatively reliable.

Network and framework

This study aims to train a deep facial expression recognition model that can classify given facial image into one of seven classes. We select the Real-world Affective Face Database (RAF-DB) as data. Different types of networks will be used, for example, multilayer perceptron and convolutional network. And all the models will be implemented using TensorFlow (Keras API). In the process of optimize model to get better accuracy, we will explore how hyperparameters influence the performance of network. Finally, the performances of these models are compared.

Reference materials

Reference materials are listed as below. 1-6 are papers and 7 is the website of data used in this project.

1. Li, S., & Deng, W. (2018). Deep Facial Expression Recognition: A Survey. arXiv preprint arXiv:1804.08348.

2. Li, S., Deng, W., & Du, J. (2017, July). Reliable crowdsourcing and deep locality-preserving learning for expression recognition in the wild. In Computer Vision and Pattern Recognition (CVPR), 2017 IEEE Conference on (pp. 2584-2593). IEEE.

4.Li, S., & Deng, W. (2019). Reliable crowdsourcing and deep locality-preserving learning for unconstrained facial expression recognition. IEEE Transactions on Image Processing, 28(1), 356-370.

5. Simonyan, K., & Zisserman, A. (2014). Very deep convolutional networks for large-scale image recognition. arXiv preprint arXiv:1409.1556.

6. Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012). Imagenet classification with deep convolutional neural networks. In Advances in neural information processing systems (pp. 1097-1105).

7. http://whdeng.cn/RAF/model1.html

Model Evaluation

We plan to check the validation loss and validation accuracy by “history” in Keras and by tensor board.

Schedule

- 10/031-11/24: Reading reference materials; learning and exercising network and algorithms
- 11/25-12/2: Traning and improving models
- 12/2-12/9: Continue training models and write materials for project
- 12/10: Presentations. Due date for all materials.

Reference

Li, S., & Deng, W. (2018). Deep Facial Expression Recognition: A Survey. arXiv preprint arXiv:1804.08348.